NORTH PACIFIC OCEAN, JUNE 1938

By WILLIS E. HURD

Atmospheric pressure.—Early summer usually witnesses a marked weakening to almost complete disappearance of the Aleutian cyclone. In June 1938, however, pressure over the eastern Aleutians was extraordinarily low for the month, the average barometer at Dutch Harbor, 29.68, being 0.22 inch below the normal. June was the fourth successive month in which the Aleutian LOW was unusually developed.

Anticyclones prevailed over most central waters of the ocean and thence northeastward to the coast between Oregon and Southeastern Alaska. Average pressures at Midway Island and Tatoosh Island, at the center and the eastern edge, respectively, of the North Pacific HIGH were above the normal of the month.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, June 1938, at selected stations*

	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Point Barrow	29.39	−0.10	30.18	6	29.18	19
Dutch Harbor	29.68	−.22	30.20	2	29.00	17
St. Paul	29.75	−.11	30.32	2	29.20	17
Kodiak	29.81	−.10	30.34	22	28.86	18
Juneau	30.01	.00	30.36	21	29.39	18
Tatoosh Island	30.09	+.07	30.36	2	29.90	23
San Francisco	29.91	−.05	30.10	13	29.71	28
Mazatlan	29.85	+.02	29.94	30	29.74	27
Honolulu	30.03	−.01	30.13	6	29.94	1
Midway Island	30.14	+.09	30.30	18	30.00	30
Guam	29.84	−.03	29.89	5	29.77	27
Manila	29.78	+.03	29.86	5–10	29.62	30
Hong Kong	29.71	+.01	29.86	6	29.51	29
Petropavlosk	29.85	----------	30.18	18	29.53	10

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observation.

Storms and gales of the extratropics.—Although numerous depressions occurred in northern and extreme northwestern waters of the North Pacific, only one was of more than moderate depth. This prevailed over the eastern Aleutians and the Gulf of Alaska on the 16th to 18th and gave the lowest pressure reading of the month, 28.86, at Dutch Harbor on the 18th. It also caused the strongest wind reported for the month in upper latitudes, a gale of force 9, experienced by the Japanese motorship *Nako Maru*, near latitude 46° N., longitude 169° W., on the 17th. Local winds of force 8 occurred in the vicinity of the Gulf on the 18th and near the tip of the Alaska Peninsula on the 21st. No gales were reported during June from ships in high latitudes to the westward of the 180th meridian.

On the 2d and 3d and again on the 8th and 9th several vessels reported northwesterly gales close off the California coast. The eastern slope of a strong oceanic cyclone lay along the coast on these days, while LOWS lay over central California. The results were steep pressure gradients and strong winds along a narrow strip of sea between about Cape Mendocino and Point Conception.

Tropical cyclones and gales.—At least three distinct cyclonic developments occurred over extreme southeastern waters of the North Pacific this month. Two were of near hurricane intensity as observed over short periods. In addition, there was another possible development, shown only by an observation of a northeast gale of force 8 experienced by the American steamer *R. J. Hanna* south of the Gulf of Tehuantepec on the 2d.

The earliest and deepest of the known cyclones was observed on the 15th by the American steamer *Chickasaw City*, Capt. H. G. Eaton, observer J. Van Duren, Hilo toward the Canal Zone. The ship entered the storm zone with a northeast wind of force 7 at 4 a. m., when about midway on her voyage. Shortly after noon the gale had increased to force 10, and at 4 p. m. was of force 11. At 5 p. m. the ship's barometer, corrected, read 28.84, with wind changing from strong northeasterly to east-southeast, force 5, at or near the storm center. Southeast to south winds of forces 8–10 continued thereafter until midnight. The cyclone was apparently moving in a northwesterly direction. There are no further observations available concerning its movements.

On June 20 there were evidences of a cyclonic formation west of Manzanillo, Mexico. On the Dutch motorship *Loosdrecht* the barometer fell to 29.68 inches near 19° N., 105½° W., with a west wind of force 6. The ship reported receiving radio warnings of a storm in the vicinity. No further developments were observed on the 21st, but on the 22d, at the entrance to the Gulf of California, the American steamers *Honolulan* and *Kentuckian* reported gales of fresh to strong force, one from southeast, the other from southwest, with lowest barometer 29.59 inches. This depression was not observed thereafter.

A further near-hurricane was experienced by the Matson Line steamer *Helen Whittier* off the Mexican coast southeast of Acapulco. This ship, Los Angeles to Balboa, according to a special report made to the Hydrographic Office by Second Officer R. H. Ritter, first came under the influence of the cyclone at 1 p. m. of the 25th, with increasing east winds and slowly falling barometer. At noon of the 26th, after northeast winds of force 10 with heavy rain, the storm suddenly abated as the ship entered the center of the storm in 15°55′ N., 99°05′ W., by dead reckoning. Here the winds were calm to light and variable for an hour, lowest barometer 29.14. At 2 p. m. the wind was west-southwest, force 10, and at 3 p. m., southwest, force 11, thereafter rapidly decreasing. Mr. Ritter said the storm appeared to be traveling on a northwesterly course.

Elsewhere in this issue of the REVIEW is a report by the Rev. Bernard F. Doucette, S. J., Philippine Weather Bureau, of two typhoons that occurred in the Far East during June 1938. In connection with these storms, D. C. Mens, observing officer on the Dutch motorship *Bengalen*, Manila toward Portland, reported on June 26, when near 22° N., 124° E., that the ship's barometer was falling due to the presence of a typhoon east of Luzon. Typhoon indications continued to be observed on ship, but no gales were encountered until the 29th when, near 30° N., 136° E., the vessel ran into southeasterly winds of force 8, lowest barometer 29.36. At local noon of the following day, in 33°30′ N., 143°14′ E., the gale had risen to force 10 from the south-southwest. By 4 p. m. the wind had fallen to force 8, as the typhoon moved northward toward Japan.

Fog.—There was no material change in fogginess during June over that observed the previous month on the North Pacific, except that along the western part of the northern routes there was some increase in frequency. From near the central Aleutians southwestward to northern Japan fog occurred on about 20 to 30 percent or more of the days. To the eastward of this belt of major occurrence the frequency decreased to about 3 to 15 percent. In east longitudes fog was observed infrequently as far south as the 30th parallel. Fog was reported on 4 days off the Washington coast; on 4 days off southern California; and on 2 days off Lower California.

St. Elmo's fire.—The British steamship *Jhelum* reported to the Hydrographic Office that, during a heavy shower in the Gulf of Tehuantepec and for a half hour

thereafter on June 19, purple glows were observed on the mastheads and aerials.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, JUNE 1938

BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

Typhoons of June 22–27 and June 25–July 1, 1938.—The pressure values reported over the Philippines were very high during the first two-thirds of the month and began to fall on June 20, after which there were signs that a low pressure area was in existence between the Archipelago and the Mariana Islands. Not until June 22, however, did a definite center manifest itself, appearing about 500 miles east-northeast of Manila. Moving about 250 miles along a west-northwesterly course and then changing to a northerly one, the disturbance, on the morning of June 24, reached the extreme eastern section of the Balintang Channel, where it was powerful enough to be classified as a typhoon. A sudden change of direction to the east followed, and then, during the afternoon hours of June 25, a shift to the northeast brought the typhoon to the regions half way between the northern Nansei Islands and the Bonins, where the storm disappeared.

While the storm described above was intensifying, another weak center appeared west of the Mariana Islands. It moved along a west-northwesterly track to the locality of latitude 20° N., longitude 130° E., where it intensified as it changed its direction to the north-northeast (morning hours of June 27). During the next few days the storm moved toward Japan, being central about 100 miles southeast of the coastline on June 30, 6 a. m. (Manila time). A change to the east-northeast kept the center from passing over land, and then an inclination to the northeast combined with a more rapid movement carried the disturbance on toward the Aleutian Islands.

Both of the above typhoons were well developed. After June 25, when the centers were more than 200 miles away from northern portions of the Archipelago, pressure values between 749.5 mm. and 752 mm (29.508 in. and 29.606 in.) were maintained for four or five days. On June 29, Oshima and Naha, Nansei Islands, had values of 748 mm and 749 mm (29.449 in. and 29.488 in.) as the typhoon passed to the east.

On June 29 and 30, great destruction resulted in Japan, according to news dispatches. About 100 lives were lost, many more persons were missing, and thousands of houses were destroyed. Railroads suffered much damage, tracks being washed away by the floods and landslides. In the Philippines, rainy weather prevailed during this period, causing the loss of three lives and considerable flood damage.

Connected with a description of these two typhoons, a few remarks concerning the air streams surrounding the centers might be of interest. On June 20 the front between the southwest monsoon air (TE) and the trade wind air (TM), which had been quasi-stationary over the southern part of the China Sea, moved in a northeasterly direction across the Philippines and relocated itself over the Pacific, extending from the Continent across the locality of the Balintang Channel and over the Pacific to the northern part of the Mariana Islands. The two typhoons developed along this front; the first at the western part; the second over the eastern portion. The upper wind data available indicate that the southwest monsoon air was an important factor in the development of the two typhoons. During the whole period, there was a steady southwest-quadrant current over the Straits Settlements, Siam, Indochina, Hong Kong, and the Philippines. Velocities reported on June 20 were under 40 k. p. h. and afterwards they steadily increased to values between 50 and 70 k. p. h. (these velocities occurring on June 27 to 29). Then they gradually weakened as the second typhoon approached Japan. Other air streams moving toward the storm centers did not equal these velocities. At Guam, with southwesterly winds changing to southeasterly, velocities did not rise above 45 k. p. h. The U. S. S. *Ramapo* was able to give information northeast of the center and reported weak southeast winds. At Shanghai, (west-northwest and west of the typhoon) the U. S. S. *Augusta* has southwesterly winds until June 27 when they changed to southeast quadrant, velocities always under 45 k. p. h. These upper air observations were made (except in the case of Guam) much closer to the center than Siam or Indochina, at which places much stronger winds were reported.

Another interesting air stream to be noted is an easterly current aloft over the northern part of the Philippines and Indochina, this current flowing above the southwesterly winds. At Aparri, a station in northern Luzon, the southwesterly current varied in thickness from 1700 *m* to 3700 *m* with easterly winds above it. At Manila, the easterly movement of the high clouds showed the existence of this current but only one balloon ascent (that of June 25, afternoon) reached the easterly current, altitude 4400 *m*. Over Indochina, the easterly current, according to the pilots available, was never below 6500 *m*. At Hong Kong, likewise, the easterly winds were high, 5000 *m* or 6000 *m*. These few remarks are given to show the existence of that air stream above the more active, as shown by velocities, southwesterly current at the lower levels.

SEA SURFACE TEMPERATURE SUMMARY FOR THE VICINITY OF THE GRAND BANKS, 1912–31

By GILES SLOCUM

The area embraced in this summary comprises nine 1° squares, namely: From 45° North to 46° North, 50° West to 55° West; from 46° North to 48° North, 50° West to 52° West.

This area lies to the south and east of Newfoundland, and is within the Labrador Current. The surface water in this region is colder than in any part of the North Atlantic Ocean farther eastward at the same or lower latitudes. It is not as cold as the surface water of the Gulf of St. Lawrence, or that of the North Pacific Ocean at the same latitude in the vicinity of Hokkaido and Chishima. It is colder than the surface water of the Sea of Okotschk and the northern part of the Gulf of Tartary in summer, but is warmer in winter; and it is colder in winter [1] than the cold surface water of the polar

[1] Winter and summer refer to the cold and warm seasons, respectively, of the hemisphere concerned.